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ABSTRACT

Recent investigations have demonstrated that white middle-class preschoolers are sensitive to temporal order, understand that causes precede consequences, and can identify the causes and consequences of events. The present study is an attempt to extend these recent investigations of temporal order understanding to a non-middle-income, non-white population. A series of three experiments were conducted to examine low-income black preschoolers' (approximately 5 years of age) to comprehend the temporal relationships between events; however, their ability to demonstrate their understanding is limited when procedures demand the perceptual encoding of visual material. Consistent findings indicating equal ability to reason about temporal relationships in a backward or forward direction suggest that when the task is sufficiently simplified for preschoolers (i.e., one sequence is presented, and memory or inferential reasoning demands are held at a minimum) simultaneous emergence of backward and forward reasoning is evident. It is concluded that low-income black preschoolers exhibit entry-level skills in the development of operations for comprehending temporal relationships. (Author/MP)

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Low-Income, Black Preschoolers' Ability to Complete Temporally-Ordered Sequences

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Contrary to Piaget's (1928, 1930, 1969) evidence of the preoperational child's confusion about temporal and causal order, recent research has demonstrated that preschoolers are sensitive to temporal order (Brown, 1975, 1976), understand that causes precede consequences (Bullock and Gelman, 1979; Kun, 1978), and can identify the causes and consequences of events (Kun, 1978) when given tasks which do not rely heavily on their limited linguistic abilities (Gelman, 1979) and do not involve complex procedural conditions (Brown and French, 1976).

An issue which has not been addressed is whether or not these competencies (and limitations) are exhibited by preschoolers who are not from the white, middle socio-economic population. The present investigation examined low-income, black preschoolers comprehension of temporal order in order to broaden our understanding of the ontogenesis of temporal/causal skills.

Experiment 1

Purpose: Examination of low-income, black preschoolers ability to complete temporally-ordered sequences, using initial or terminal events as the point of departure.

Subjects: 103 preschoolers (54 boys and 49 girls) (Mean age = 4 years 5 months) from three Title I preschools.

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Procedure: Each child was presented a total of ten three-picture sequences (obtained from Brown and French, 1976); sequences were presented one at a time. For five of the sequences, the initial and middle pictures were presented and the child was required to select from five additional pictures (one correct and four distractors) that picture which terminated the sequence. For the remaining five sequences, the child was given the middle and terminal pictures and required to find the initial picture. The find-terminal and find-initial sequences were alternated throughout. All pictures depicted the same character in a variety of situations.

Results and Discussion: A score of one was given if the sequence was correctly completed. Scores ranged from 0 to 10; M = 3.6. Children demonstrated no significant difference in their ability to identify initial ($\bar{X}$ = 1.87) or terminal events ($\bar{X}$ = 1.75). Despite the relatively simple task of completing one sequence at a time, these low-income children exhibited limited comprehension of the temporal/causal relationship between events.

Experiment 2

Purpose: To examine the preschoolers' understanding of temporal/causal relations after 8 months of maturation and attendance to an "enrichment-oriented" preschool program. (The examination of the relative influence of each of these variables was not possible given the unavailability of an appropriate control group.)

Subjects: 49 of the children used in Experiment 1 who regularly attended the preschool program from September to May.

Procedure: The procedure remained relatively the same with the addition of two steps. After the children made their choice of picture to com-

plete the sequence, any incorrect choices were recorded, and children were asked to describe each story.

Results and Discussion: Children's scores showed a significant improvement (t (48) = 7.05, $p < .001$); M = 6.2 correctly completed sequences. However, the range of scores remained quite wide (2-10); 38.8% were still completing five or less sequences. Children demonstrated no significant difference in correctly identifying the initial ($\bar{X}$ = 3.45) or terminal event ($\bar{X}$ =2.78). Incorrect choices were random with regard to sequence and distractor; therefore, scores were not affected by a few aberrant pictures. Analysis of children's story descriptions, using a coding scheme (0, 1, or 2 points; 94.6% interrater agreement) reflecting their understanding of the content of the pictures, suggests that low-scorers (less than 5 correct sequences) (1) may be having difficulty in perceptually discerning the theme of the pictured events (score 0) or (2) may not be systematically scanning and logically searching for the correct picture to complete the sequence (score 1).

Experiment 3

Purpose: To examine whether or not (1) having the children describe each picture, thus demanding systematic focused attention, before making a choice or (2) having the experimenter describe the content of each picture, thus removing the demand for the children to discern the contents, would increase their ability to correctly complete temporal sequences.

Subjects: 54 low-income, black preschoolers (Mean age = 5 years 2 months) were obtained from four child care centers.

Procedure: Children from each center were randomly assigned to one of three conditions: (1) children were given the same instructions as the

last sample, acting as a comparison group; (2) children were instructed to describe each picture before making their choice; (3) the experimenter described the pictured event upon presenting each picture.

Results and Discussion: Mean scores for Condition 1 = 6.5; Condition 2= 5.1; Condition 3 = 8.3. A one-way ANOVA showed a significant difference between groups (F (2,51) = 14.54, $p<.001$). Newman-Keuls comparisons indicated Condition 3 was greater than Condition 2 ($p<.001$) and Condition 1 ($p<.01$). Likewise, Condition 1 was greater than Condition 2 ($p<.05$). Children displayed no significant differential ability in finding terminal or initial events in any condition. These results demonstrate that low-income preschoolers' ability to complete temporally-ordered sequences is substantially improved by removing the demand that the children perceptually encode the pictures themselves.

General Discussion

The overall findings of this series of investigations indicate that low-income, black preschoolers (approximately 5 years of age) do comprehend the temporal relationship between events; however, their ability to demonstrate their understanding is limited when procedures demand the perceptual encoding of visual material. Consistent findings indicating equal ability to reason about temporal relationships in a backward or forward direction suggests that when the task is sufficiently simplified for preschoolers (i.e., one sequence is presented, and memory or inferential reasoning demands are held at a minimum) simultaneous emergence of backward and forward reasoning is evident. Although the demonstration of bidirectionality under such liberal testing conditions may not be indicative of Piagetian operativity (Brown, 1976), one can conclude that

low-income, black preschoolers exhibit entry-level skills in the development of operations for comprehending temporal relationships. These findings support and extend our understanding of the ontogenesis of temporal/causal understanding based on middle-income, white samples.

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